

In the claims:

Please amend claims 78 and 87 as follows. A marked version of the amended claims showing the changes is included following the Remarks section of this Amendment. Also please add claims 97-98.

CLEAN VERSION OF AMENDED CLAIMS

78. (six times amended) An apparatus for testing a semiconductor die having a plurality of pads comprising:

a plate;

a substrate on the plate comprising a plurality of contacts configured to electrically contact the pads;

a clamping mechanism attached to the plate configured to bias the contacts and the pads together with a force;

the plate, the substrate and the mechanism configured such that the die can be placed on the substrate, the mechanism attached to the plate, and the die retained between the mechanism and the substrate with the contacts in electrical contact with the pads; and

each contact comprising a bump and a plurality of spaced raised portions projecting from the bump with a height, the raised portions dimensioned to penetrate into a pad at the force to a penetration depth equal to the height but less than a thickness of the pad, the bump dimensioned to limit further penetration of the raised portions into the pad at the force.

87. (five times amended) An apparatus for testing a semiconductor die having a plurality of pads comprising:

a plate comprising a plurality of external leads;

a substrate on the plate comprising a plurality of contacts configured to electrically contact the pads;

a clamping mechanism attached to the plate configured to bias the contacts and the pads together with a force;

the plate, the substrate and the mechanism configured such that the die can be placed on the substrate, the mechanism attached to the plate, and the die retained between the mechanism and the substrate with the contacts in electrical contact with the pads;

each contact comprising a bump and a plurality of spaced raised portions projecting from the bump with a height, the raised portions configured to penetrate into a pad with a penetration depth equal to the height but less than a thickness of the pad while the bump limits further penetration, the force selected to be greater than a first force at which the raised portions penetrate the pad but less than a second force at which the bump penetrates the pad, the second force being from two to ten times the first force.

97. (added) An apparatus for testing a semiconductor die having a pad with a thickness comprising:

a plate;

a substrate on the plate comprising a contact configured to electrically contact the pad, the contact comprising a bump having a surface and at least one raised portion projecting from the surface with a height, the raised portion and the surface configured such that the raised portion can penetrate into the pad to a penetration depth equal to the height but less than the thickness while the surface limits further penetration into the pad; and

a clamping mechanism attached to the plate configured to bias the die and the substrate together with a force selected to achieve penetration of the pad by the raised portion but to prevent damage to the pad by the bump.

98. (added) The apparatus of claim 97 wherein the contact comprises a plurality of raised portions and the raised portions comprise pointed members.

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CLEAN VERSION OF ALL PENDING CLAIMS

78. (six times amended) An apparatus for testing a semiconductor die having a plurality of pads comprising:

a plate;

a substrate on the plate comprising a plurality of contacts configured to electrically contact the pads;

a clamping mechanism attached to the plate configured to bias the contacts and the pads together with a force;

the plate, the substrate and the mechanism configured such that the die can be placed on the substrate, the mechanism attached to the plate, and the die retained between the mechanism and the substrate with the contacts in electrical contact with the pads; and

each contact comprising a bump and a plurality of spaced raised portions projecting from the bump with a height, the raised portions dimensioned to penetrate into a pad at the force to a penetration depth equal to the height but less than a thickness of the pad, the bump dimensioned to limit further penetration of the raised portions into the pad at the force.

79. (five times amended) The apparatus of claim 78 wherein the bump is dimensioned to penetrate into the pad at a second force which is about two to ten times the force.

80. (five times amended) The apparatus of claim 78 further comprising a plurality of conductive traces on the substrate in electrical communication with the contacts, and a plurality of external contacts on the plate in electrical communication with the traces.

81. (five times amended) The apparatus of claim 78 wherein the height is about 5000Å.

82. (five times amended) The apparatus of claim 78 wherein the pads comprises bondpads.

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87. (five times amended) An apparatus for testing a semiconductor die having a plurality of pads comprising:

a plate comprising a plurality of external leads;
a substrate on the plate comprising a plurality of contacts configured to electrically contact the pads;

a clamping mechanism attached to the plate configured to bias the contacts and the pads together with a force;

the plate, the substrate and the mechanism configured such that the die can be placed on the substrate, the mechanism attached to the plate, and the die retained between the mechanism and the substrate with the contacts in electrical contact with the pads;

each contact comprising a bump and a plurality of spaced raised portions projecting from the bump with a height, the raised portions configured to penetrate into a pad with a penetration depth equal to the height but less than a thickness of the pad while the bump limits further penetration, the force selected to be greater than a first force at which the raised portions penetrate the pad but less than a second force at which the bump penetrates the pad, the second force being from two to ten times the first force.

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88. (four times amended) The apparatus of claim 87 wherein the height is at least 5000Å.

90. (four times amended) The apparatus of claim 87 wherein the bump comprises a surface and the raised portions project from the surface.

91. (four times amended) The apparatus of claim 87 further comprising a plurality of bond pads on the conductive traces.

92. (four times amended) An apparatus for testing a semiconductor die having a plurality of pads comprising:

a plate;

a substrate on the plate comprising a plurality of contacts configured to electrically contact the pads;

a clamping mechanism attached to the plate configured to bias the contacts and the pads together with a force;

the plate, the substrate and the mechanism configured such that the die can be placed on the substrate, the mechanism attached to the plate, and the die retained between the mechanism and the substrate with the contacts in electrical contact with the pads;

each contact comprising a bump having a surface and a plurality of spaced raised portions projecting from the surface dimensioned to penetrate into a pad at the force by a penetration depth equal to a height of the raised portions but less than a thickness of the pad while the surface limits further penetration into the pad, the force selected to be greater than a first force at which the raised portions penetrate the pad but less than a second force at which the bump penetrates the pad.

93. (four times amended) The apparatus of claim 92 further comprising a plurality of external leads on the plate in electrical communication with the contacts.

96. (four times amended) The apparatus of claim 92 wherein the raised portions comprise points.

97. (added) An apparatus for testing a semiconductor die having a pad with a thickness comprising:

a plate;

a substrate on the plate comprising a contact configured to electrically contact the pad, the contact comprising a bump having a surface and at least one raised portion projecting from the surface with a height, the raised portion

and the surface configured such that the raised portion can penetrate into the pad to a penetration depth equal to the height but less than the thickness while the surface limits further penetration into the pad; and

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a clamping mechanism attached to the plate configured to bias the die and the substrate together with a force selected to achieve penetration of the pad by the raised portion but to prevent damage to the pad by the bump.

98. (added) The apparatus of claim 97 wherein the contact comprises a plurality of raised portions and the raised portions comprise pointed members.